EXHIBIT A

MesoSystems Technology, Inc.
Corporate Overview

1021 N. Kellogg Street

Kennewick, Washington

(509) 737-8383

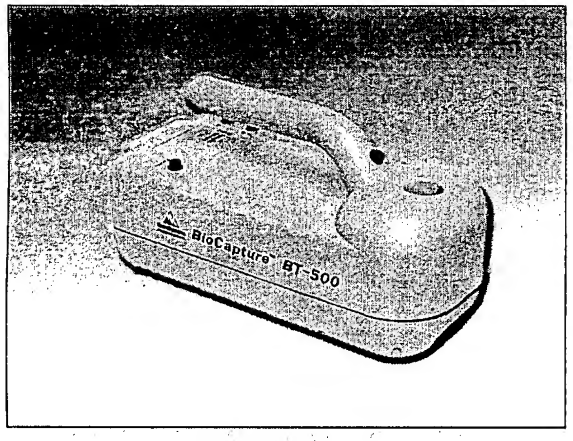
Charles Call, President and CEO

CCall@mesosystems.com

Miniature Bio-Aerosol Collectors

MesoSystems
MesoSystems Technology, Inc.

BioCapture™ Air Sampler

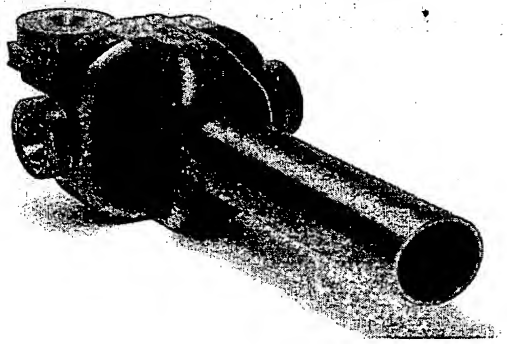


Features

- Fully automated system
- One button operation
- Ergonomically designed
- Water resistant
- Durable

Personal Air Sampler

BioVIC™ Concentrator



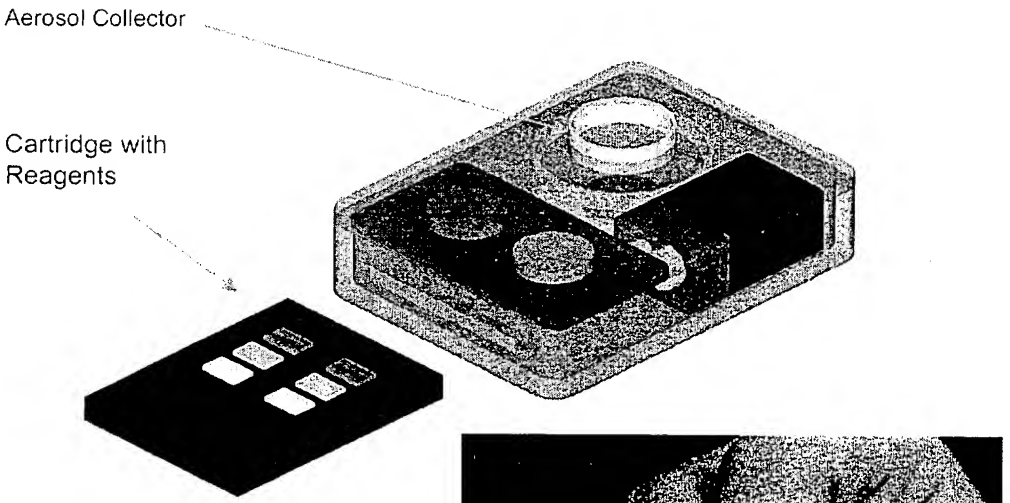
Features

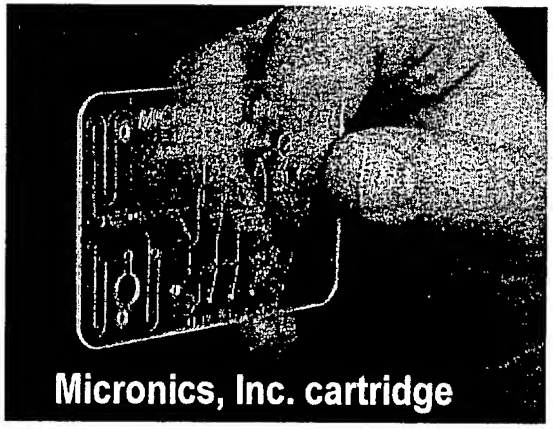
- Virtual impaction concentration
- Dry sample collection
- 80% single stage efficiency with $>10^6$ CF
- Readily scaled to variety of flow rates
- Low power requirements

Product Pipeline

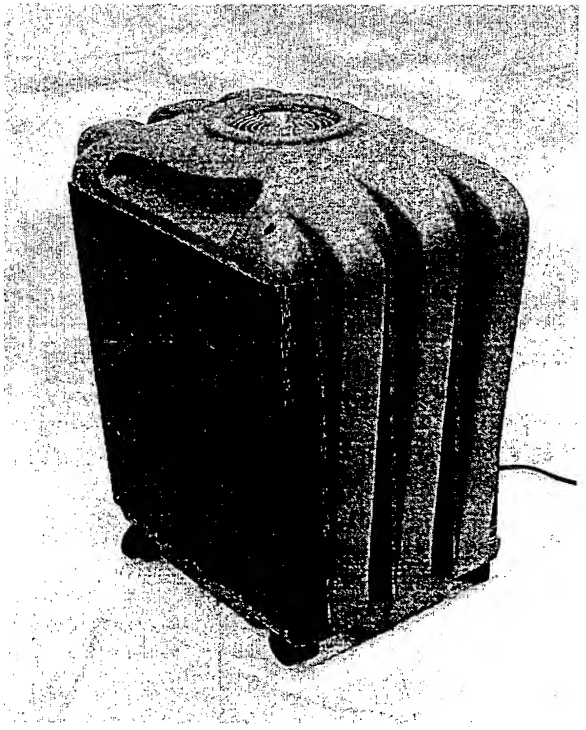
MesoSystems
MesoSystems Technology, Inc.

BioMonitor™





Scavenger™



Summary

MesoSystems
MesoSystems Technology, Inc.

- MesoSystems' Progress
  - Defense funded technology development
  - Building infrastructure for sustainable growth
  - First products shipped in 2000
  - New products out in late 2001
- A deep pipeline of technology for future products
- Solid track record of delivering on commitments

Why Us?

MesoSystems
MesoSystems Technology, Inc.

- We are here to develop a solution which solves a difficult problem.
  - If we come up with the gold standard solution, we are building value in our company.
  - We can help create a more secure environment
- We are recognized as the leaders in biological agent collection
- Through our IP and alliances, we can deliver the integrated solution
- Experience

Project SafeMail

Automated Mail Inspection for Biological Agents

Prepared for MicroSoft Corporation

Charles Call, CEO — CCall@mesosystems.com
Eric Hanczyc, VP R&D — EHanczyc@mesosystems.com
Pat Call, BioCapture™ Product Mgr — PCall@mesosystems.com

Take-home Message

MesoSystems
MesoSystems Technology, Inc.

- This has never been done before
- The white house and the pentagon don't have the capability offered today
- **Microsoft will have the first-ever system in place that integrates continuous air monitoring, air sampling and PCR agent identification**
- Microsoft will define the standard for mail and building security

Disclaimer

MesoSystems
MesoSystems Technology, Inc.

- We will develop and deploy a "bleeding edge" solution for mail and building security

- We can not guarantee that the system find the bioagent 100% of the time
  - There is an "experience curve" and we are at the origin
  - We will constantly challenge the system with simulated "attacks"

Outline for *Project SafeMail*

MesoSystems
MesoSystems Technology, Inc.

- Project Team
- Objective
- Cost and Schedule

Project Team

MesoSystems
MesoSystems Technology, Inc.

- Microsoft (Development site)
  - Building 123 Facility
  - Facilities management (HVAC)
- Pitney Bowes (Operations lead)
- MesoSystems (Hardware lead)
  - Pacific Scientific Instruments
  - Idaho Technology

Objective

MesoSystems
MesoSystems Technology, Inc.

Goal:

Develop and operationally deploy a *CB Sentinel*™ hardware at Microsoft's Building 123

Two issues:

Immediate solution to existing situation

Permanent solution to mail screening

Cost and Schedule Estimate

MesoSystems
MesoSystems Technology, Inc.

- Temporary Mail Processing Facility
  - $200k
    - Equipment for field laboratory including PCR ($100k)
    - Temporary facility in parking lot outside Building 123
  - $40k/month field support at high threat level
    - Test Engineer
    - Microbiologist (Ph.D.)
    - Field laboratory on site
  - $15k/month at low threat level
- Schedule
  - Limited operations in 7-10days
  - Continuous improvement for 3 months

Cost and Schedule Summary

MesoSystems
MesoSystems Technology, Inc.

- Permanent Mail Processing Facility Enhancement based on *CB Sentinel*™
  - $5M (rough order of magnitude for initial system)
    - Equipment for field laboratory including PCR
  - $10k/month support contract per installation
- Schedule
  - Limited operation in 6 months
  - Full Operations in 12 months

Protection from other threats

DuctMonitor

MesoSystems
MesoSystems Technology, Inc.

- Chemical and biological air monitoring using ***CB Sentinel™***
- Can be integrated with response
  - Sprinkler-based decontamination
  - Scavenger™ for chem and bio agents (when available)
- Scavenger Advantages:
  - Low maintenance
  - Impossible to "overwhelm"

Tools for Security Technicians

MesoSystems
MesoSystems Technology, Inc.

- Biological Agents
  - BioCapture™ Air Sampler
  - Rapid™ PCR by Idaho Technologies
- Chemical Agent Detectors

Saferoom

MesoSystems
MesoSystems Technology, Inc.

- Positive pressure in small room
- Chemical and biological air purification using MesoSystems' Scavenger™ technology
  - Recirculation filter
  - Make-up air filter
  - Positive pressure in safe room
- Sprinkler-based decontamination
- Advantages:
  - Low maintenance
  - Impossible to "overwhelm"

MesoSystems
MesoSystems Technology, Inc.

CB Sentinel™
Real-time Monitoring of Chemical and Biological Agents

Prepared for MicroSoft Corporation

Charles Call, CEO — CCall@mesosystems.com
Eric Hanczyc, VP R&D — EHanczyc@mesosystems.com
Pat Call, BioCapture Product Mgr. — PCall@mesosystems.com

CB Sentinel™

MesoSystems
MesoSystems Technology, Inc.

Technology by MesoSystems

- DARPA's Immune Building Program
  - Duct mounted air sampler
  - Highflow chemical sampler
- Joint Program Office for
  - Dry sampler
- BioCapture™
- BioArchiver™

Strategic Alliances

- PSI (triggers)
- SRI (immunassay)
- UW/Micronics (automated sample prep.)
- Cepheid or IT (PCR)
- Tetracore (reagents)
- Lockheed (oversight?)

Features

- Trigger: Continous monitoring with UV particle counter (detects living organisms)
- Continuous aerosol archive via dry sampling
  - Forensics
  - Redundancy
- When Triggered: collects high flow rate wet sample, detects and identifies agents
  - Wet archive for state health department/FBI
  - Automatic detection by immunoassay strips and PCR
- Modular: Allows field upgrates as better technology emerges

Cost and Schedule

- Alpha prototype
  - $300k and 3 months
- Beta prototype
  - $2M and 6 months

Alpha System

MesoSystems
MesoSystems Technology, Inc.

- Objective: demonstrate the integration of a UV trigger with the *BioCapture*™ sample collector
  - Continuous (24-7) monitoring with UV trigger
  - Evaluation of chemical monitors
  - Evaluation of PCR
- Demonstrated at MesoSystems in 12 weeks
- Deployed in 14 weeks for field trial

Beta System

MesoSystems
MesoSystems Technology, Inc.

- Objective: Demonstrate and thoroughly field test fully-operational, modular ***CB Sentinel™*** in B123
- Initial demonstration in 6 months
  - Chemical and biological trigger
  - High flow rate sample collection system (*BioVIC + BioCapture™*)
  - *BioArchiver™ and ChemArchiver™*
  - PCR identification integrated
  - Automated immunoassay integrated
  - Evaluation of biotoxin sensors completed (Sandia, JHU, others)
- Field testing
  - Duration: 3 months
  - Incorporate field testing into performance enhancements: leads to second generation beta
- Project Complete: 1 year

EXHIBIT B

White Paper Proposal

SafeMail -- A Robust System for Screening Mail for Biological Agents

Points of Contact:

Charles Call, Ph.D.
President and Chief Executive
MesoSystems Technology, Inc.
1021 N. Kellogg Street
Kennewick, WA 99336
(509) 737-8383
(505) 301-5419 (cell phone)

Richard DeFreez, Ph.D.
Principal Scientist, Photonics R&D Manager
Pacific Scientific Instruments
481 California Avenue
Grants Pass, OR 97526
(541) 472-6630
(541) 601-3476 (cell phone)

Confidentiality Statement:

SafeMail -- A Robust System for Screening Mail for Biological Agents

1.0 Problem Description

Letters containing weapons-grade *Bacillus anthracis* (aka anthrax) spores have been passed through the United States Postal Service (USPS) in recent weeks. The result to date is that many individuals have become infected by the spores and at least two postal service workers one hospital worker have died of inhalation anthrax. In addition, several mail processing facilities, and the equipment within those facilities have become contaminated.

Technology is urgently needed to identify which letters passing into the postal system are contaminated with *anthracis* spores. Ideally, contaminated letters would be identified as they enter the USPS, but a need certainly exists to identify contaminated letters within the system and in private/corporate mailrooms. Beyond *anthracis*, other biological agents pose a threat and therefore should be monitored.

There is a pressing need to "stand up" a temporary solution immediately. Additional letters containing *anthracis* spores may be in the USPS system now.

Looking forward slightly further out in time, a permanent solution is required that can meet the following **objectives**:

1.) The system can effectively process very high volumes of mail daily (10-100s of millions per day). The USPS processes approximately 550 million pieces of mail per day.

2.) The system is effective in detecting contaminated or suspect letters.

3.) The system has an extremely low rate of false negatives (i.e., does not "miss" ANY contaminated letters).

4.) The system has an extremely low rate of false positives (1 false positive in 500 million letters may be unacceptably high!)

5.) The system is affordable. An acceptable cost for the USPS has not been estimated.

6.) A product for screening mail must be compatible with existing mail processing technology and operations.

Recent discussions with a Fortune 50 company suggests that an operating cost of $100,000 per year might be acceptable and a capital cost of up to $5M might be acceptable is if the system is capable of processing most of the 'corporations' mail. This particular corporation's mail is processed by a contractor at a central facility. Assuming the crisis dissipates over time, acceptable costs to corporate America will likely drop.

2.0 Technical Approach: SafeMail: A Systems Level Solution

SafeMail is a robust, leap-ahead solution for mail screening that has a strong potential to meet **all** of the objectives identified above. A first installation of a non-automated implementation of SafeMail can be deployed within 2-3 weeks from the launch of the project. Automation can be added in "real time" to installed equipment. Full automation, with the associated testing and validation, is expected to take 12 months.

The SafeMail product will be designed to operate 20 hours per day. This equates to 72,000 letters per day if one letter mail is processed per second. The USPS currently processes letter mail at 3 letters per second, so jumping from 1 to 3 should be straightforward. "Flats," such as magazines, are currently processed at 1 piece per second. We estimate that approximately 2000 SafeMail systems would be capable of screening every letter that enters the USPS mail system for biological agents.

Chemical and radioactivity sensors are easily added to the system. This technology is considerably more mature than biological agent detection technology.

2.1 Overview of the SafeMail Technology

SafeMail consists of three major hardware sub-systems that can be added to existing mail processing hardware:

1. A letter-handling system brings mail into the **Containment Chamber**, which consists of custom chamber with a HEPA filtration system, a mechanism for opening the letters, and air jet nozzles for aerosolizing any powders which might be on the surface or contained within the letters. The containment chamber is operated at negative pressure so aerosols do not escape.

2. The **BioSentinel™** biological agent detection system continuously concentrates the aerosols generated in the containment chamber, monitors the level of bioaerosols within the sampled air stream, and detects and identifies microbes when a suspect letter has been detected. The BioSentinel™ also collects and stores a continuous archive of the aerosol for forensics purposes.

3. If a contaminated letter is discovered, then **Bioagent Decontamination** fluid is sprayed inside the containment chamber, and if appropriate based on tests to be completed, throughout the mailroom.

2.2 Operations Approach

The basic operational methodology to screen mail begins with the mail in a bin or a bag, which is carried to the SafeMail system. Mail enters a conveyer belt similar to those in existing mailrooms and similar to the checked baggage conveyer belts at any airline ticket counter. The conveyer leads the mail into a containment shroud. This shroud is similar to that used in conjunction with the x-ray machines at airline security checkpoint. The air space within the containment shroud is the containment chamber, and this is the space in which the particulate will be extracted from each letter.

As the mail enters the containment shelter, the following operations form the basic process by which mail is screened for *B. anthracis* spores and other bioaerosols:

1. Mail is loaded onto the conveyer belt. Commercial equipment exists for separating the individual pieces of mail and orienting them on the conveyer belt.

2. Air is extracted from each piece of mail with the aid of a laser, a mechanical punch, or simply by compression of the letter caused by the mail processing equipment or a new mechanism specifically designed to force air from each piece of mail. If a laser or mechanical punch is required, the breach might be as small as several pinholes.

3. Next, air jets are directed at the piece of mail. A netting material might be desired to keep the mail from blowing around inside the chamber.

4. The air space inside the chamber will is continuously sampled with a high flow rate particle concentrator.

5. The sampled air is monitored continuously by a UV fluorescence particle counter capable of distinguishing a particle containing a living organism from most other non-living matter. Fluorescence signals are processed in real-time.

6. When a sudden increase in the number of fluorescent particles is observed, the sample collection system is activated. Otherwise, all the sampled air is exhausted through a HEPA filter. If the collection system has been activated, the mail processing equipment is stopped so the contaminated letter does not leave the negative pressure containment chamber.

7. A highly concentrated aqueous sample of the bioaerosol is collected and analyzed. This sample is fed to a biodetection system based on DNA fingerprinting, immunoassay and/or other approaches. A second highly concentrated sample is collected and preserved for follow-up confirmation tests and forensics.

8. If a positive test results from the biodetection system, then an alarm sounds, a decontamination procedure is automatically activated, a Hazmat team is dispatched, and the FBI is notified. Personnel are evacuated and the building ventilation system is shut down. HEPA filtration systems continue to run.

2.3 Anthracis Spore Sampling and Detection with BioSentinel™

There are two key enabling technologies, which that are unique to the MesoSystems/PSI team.

1. **MicroVIC®:** the ability to sample the containment chamber air at very high flow rates (1 – 10 cubic meters per minute) and concentrate the particulate for presentation to the detection system.

2. **Bioni™:** a robust laser-based particle counter that operates in the UV frequency and has an operational life of greater than 2000 hours mean time between failures.

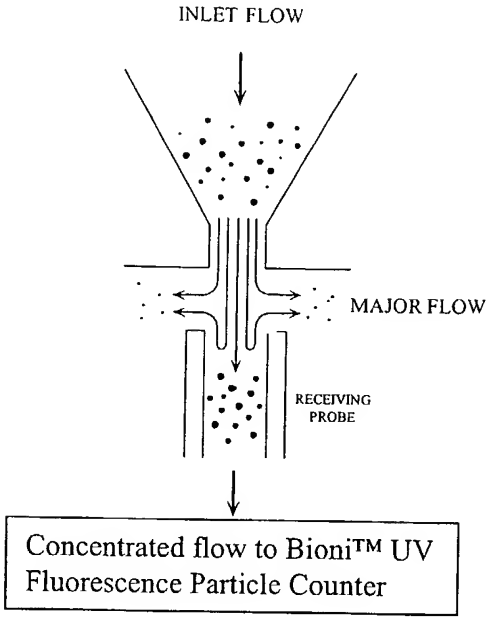
No other known components can match the performance of these two technologies, and along with the BioCapture™ wet aerosol sample collector, they form the foundation of the SafeMail product. Integration of the biodetection, sample archiver and decontamination capabilities are optional, but highly desirable. Without them, the mailroom must be immediately shut down and be evacuated until the wet sample can be removed by trained HAZMAT personnel and results released by an approved laboratory. This typically can take several days. Risk to personnel in the room is likely to be higher without automatic decontamination.

The key components of the BioSentinel™ sampling and detection systems are described in separate sections below. Each section describes the technology and the competitive advantages.

2.1 MicroVIC® Aerosol Concentrator

MesoSystems has developed and patented a high flow rate, low pressure drop virtual impaction technology (under support of DARPA/DSO and the Army AMC). The MicroVIC® technology allows the continuous concentration of airborne particles using inertial forces. Pre-concentration of particulate is necessary for both the Bioni™ UV fluorescence particle counter and the BioCapture™ aerosol collector.

The basic concept of a virtual impactor is shown in the figure below. The particle-laden air is accelerated in a nozzle toward a receiving tube or channel. The majority of the air is pulled away from the receiving tube, but due to the particles' inertia, they are entrained into a smaller air stream. This smaller air stream is a suitable flow rate to allow detection of the particles by the Bioni™. The MicroVIC® thus bridges the gap between a desire to detect particles in a high volume of air and the smaller flow rate which can be accommodated by the Bioni™ UV Fluorescence particle counter system.



Virtual impactors have been around for about 3 decades, but the MicroVIC® technology uniquely combines both the capacity for a high sampling flow rate AND relatively low pressure drop. The planar design employed by the MicroVIC® is scalable, unlike conventional (tubular) approaches. Because of the low pressure drop, conventional blower technology can be used opposed to high-flow-rate vacuum pumps, which, if used, would quickly drive up the capital and operating cost of the particle concentrator.

MicroVIC®

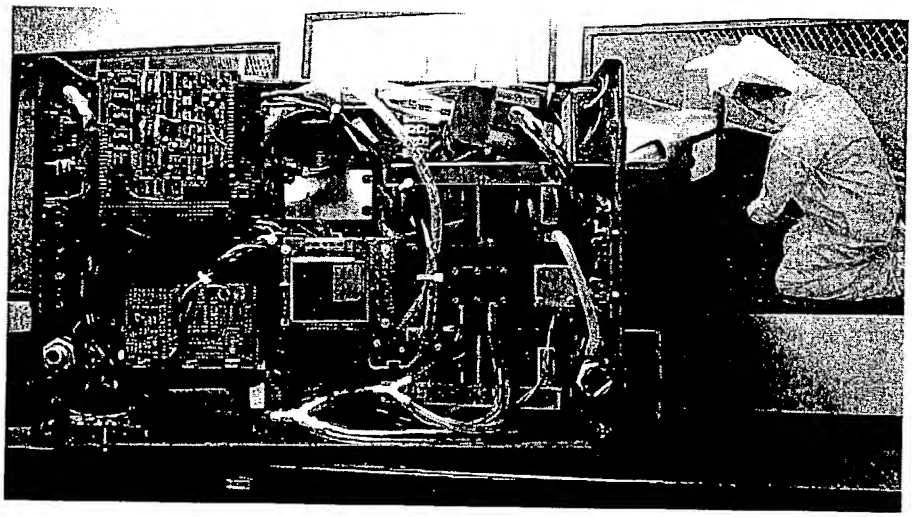
Once the particles are concentrated, they can be fed to the Bioni™ UV fluorescence particle counter.

2.2 Bioni™ UV Fluorescence Particle Counter

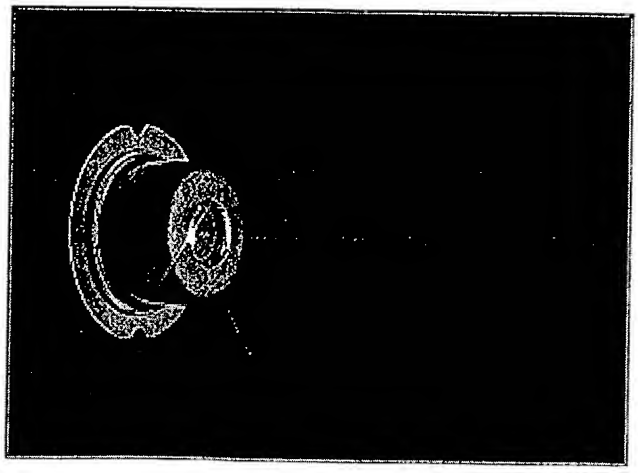
Pacific Scientific Instruments (PSI) has developed and is in the process of patenting bio-particle detectors based on laser-induced autofluorescence of NADH contained in viable biological agents such as Bacillus anthracis. To date, PSI has demonstrated two such basic technologies.

The first technology is BARTS (Biological Agent Real Time Sensor). The development of BARTS has been funded by the US Joint Program Office for Biological Defense, National Defence Canada (Defence Research Establishment Suffield and Defence Industrial Research), Computing Devices Canada, and PSI. The BARTS

technology is in its fourth generation and is a proven platform for bio-particle detection. The key technologies of BARTS are a NanoUV Diode Pumped Solid-State Laser emitting at 355 nm (near the absorption peak of NADH), a MesoSystems MicroVIC concentrator, and mini-PMT optical detectors for collection of particle fluorescence and elastic scatter information. BARTS can detect as few as 25 agent bio-particles per liter of air in real-world environments and less in HEPA filtered environments.

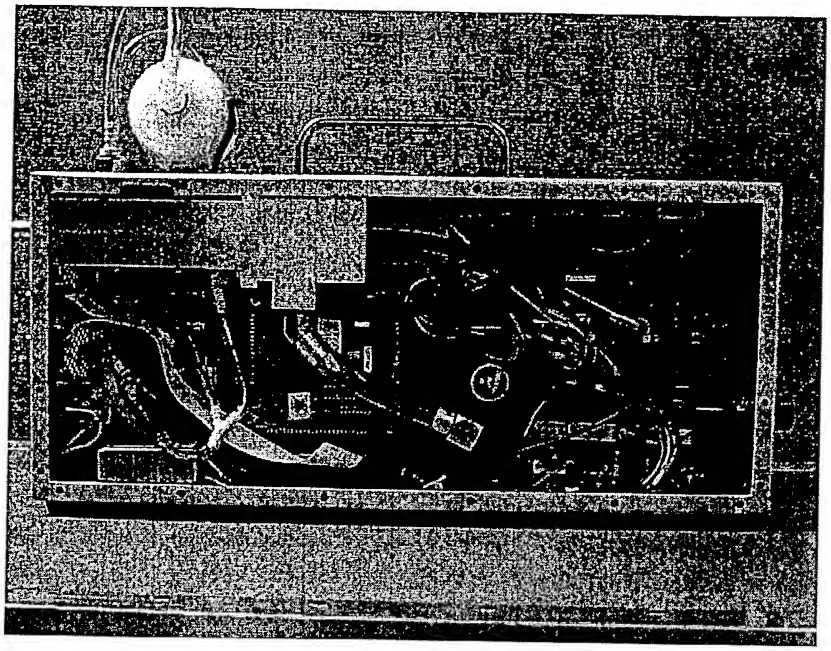


PS-BARTS



Nichia 370 nm Diode Laser

The second technology is Bioni. Bioni is new compact technology based on state-of-the-art ultraviolet diode lasers. These recently demonstrated UV diode lasers are just now available from Nichia Corporation, with whom PSI has been collaborating for nearly two years. The UV diode lasers operate in continuous mode with 2-5 mW of 370nm optical output at room temperature with a mean time to failure of over 2000 hours. In comparison to the NanoUV laser employed in BARTS, the UV diode laser is more compact, less power consumptive, and thousands of dollars less expensive each with the promise of truly low pricing in the not-too-distant future. The first generation of Bioni bio-particle detectors have recently demonstrated sensitivities of approximately 25 bio-particles per liter of air in both HEPA filtered and real-world indoor environments with the ability to distinguish between living biological particles and other environmental contaminants such as respirable pieces of envelope paper.

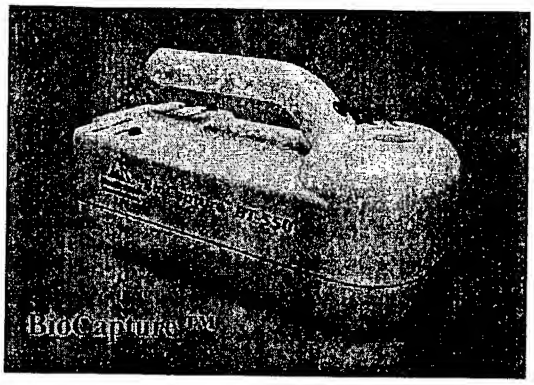


Bioni Portable Bio-Particle Detector

If the Bioni™ detects a burst (e.g., a cloud within the containment chamber) of biological particles, a wet collector is triggered.

2.3 BioCapture™ Wet Sample Collection

The BioCapture™ is a low power, bio-aerosol collection system capable of capturing airborne bacteria, spores and other pathogens into a small volume of liquid. The core technology implemented in the BioCapture™ is the patented Radial Arm Impaction technology. This system simultaneously washes the fan's impeller surface with a buffered saline fluid. Manifold geometries that allow the air to be exhausted separately from the particle-laden liquid have been optimized for minimum evaporation and maximum flow rate. Coatings on the impeller arms and the inner walls of the housing can greatly increase the collection efficiencies resulting in more concentrated liquid samples and potentially shorter sampling times. The motor and control systems have been optimized for high impeller revolution rate and low power consumption while maintaining excellent reliability.



The bio-testing facilities at the Dugway Proving Ground and the wind tunnel at MesoSystems Technology were used to quantify the collection efficiency of this device.

The BioCapture™ wet sample collector will be augmented with a MicroVIC® aerosol pre-concentrator, giving the wet collection system the capacity to sample at up to 1000s or even 10,000s of liters per minute. These large flow rates are highly advantageous with respect to the system's detection sensitivity. No other sampling system is capable of delivering the combination of both:

- efficient collection of the particles in the relevant size range, including one micron diameter single spores, and
- extremely high flow rates, approaching 10,000 liters per minute.

2.4 Detection and Identification

MesoSystems will implement the "best available technology" for *anthracis* spore detection. Currently, we believe that the best available commercial technology is represented by the Idaho Technologies RAPID PCR thermocycler.[1] Internal testing in the MesoSystems wind tunnel has conclusively demonstrated that when the wet sample is collected with the BioCapture™, sample pretreatment is not required to achieve excellent sensitivity with PCR for the detection of *Bacillus globigii* (BG) spores. Further testing and validation is urgently needed.

A second technology that can be readily integrated and is commercially available is the Tetracore, Inc. immunoassay strips. Sensitivity is not particularly high, but they are

[1] Cepheid has an outstanding thermocycler, but currently lacks an approved set of reagents. They sell the SmartCycler™, but not the reagents required to detect *B. anthracis*. They are working to overcome this limitation. The Cepheid technology development has been supported by DARPA/DSO and SBCCOM.

still expected to provide additional useful data. These strips are well suited to rapid detection of a major biological presence, such as a medically significant quantity of spores placed in an envelope.

Both of these technologies can provide a test result in less than 20 minutes.

2.5 Approach to Forensics Sample Collection

At the same time a sample is collected for identification and quantification, a second MicroVIC can be employed to collect a second sample of concentrated particles. This scheme, the heart of MesoSystems' Aerosol Archiver™ product, generates a time/date stamped record of particulate matter in a given location over time. The archiver, which periodically generates spots of particles on an archive surface, can produce a spot with any desired frequency, from once a minute to once a month. Alternatively, as in the SafeMail system, archiving is automatically initiated whenever biological particles are detected.

The ability to create an environmental archive is of great utility in a forensic analysis of contaminated mail. For example, upon discovery that a number of contaminated pieces of mail have passed through a particular post office in the United States, it would be extremely useful to consult a permanent record of archived samples from that office to determine the history of contaminated mail. An archive, which would consist of a small piece of material (a few square inches) with thousands of small spots, could allow the user to pinpoint the precise moment when the contaminant was introduced into the system. If used in conjunction with electronic mail sorting records, the archive could even allow determination of the source or destination of the offending piece of mail. In some instances, such a method could be the only viable means for determining the source of a biological agent.

The Aerosol Archiver™ works by collecting an additional sample with a MicroVIC and directing the resulting concentrated particle flow onto a surface. After a single spot is created, the surface is moved relative to the MicroVIC so that non-overlapping spots are produced. Simultaneously, a computer records the time that each spot was created. Because of the integrated computer control, the archiver can use advanced logic in determining when to sample. The sampling frequency can be up- or down-regulated based on environmental factors that include particle count, bioparticle presence, temperature, humidity, and pressure.

2.6 Bioagent Decontamination with Cecure™ Disinfectant

Cecure® is a cetylpyridinium chloride (CPC) - based antimicrobial product which is highly effective against biological pathogens. Safe Foods has primarily marketed Cecure® as a food safety product because of its effectiveness against foodborne pathogens including *Listeria, E. coli, Salmonella,* and *Campylobacter,* which can cause havoc in the food industry. Not only does it kill pathogens, but it also reduces the chance of recontamination because of the compound's ability to inhibit the attachment and

regrowth of pathogens to treated surfaces, providing a continuing antimicrobial efficacy beyond the point of application.

Safe Foods Corp. commissioned an evaluation of the antimicrobial efficacy of a 1% CPC solution against *Bacillus globigii* spores by STERIS Foodlabs, Inc. (Manhattan, KS; Drs. Lalit Bohra, Abbey Nutsch, and Randall Phebus) in March 2001. Due to the serious exposure hazards of working with *B. anthracis, B. globigii* is commonly researched as a non-pathogenic surrogate. Used as a biocide, very low CPC concentrations (1%) have been demonstrated to accomplish $\log_{10}$ 2.31 (~99.3%) reduction of the spores of *Bacillus globigii* after one minute of exposure.

As a biocide, CPC has been shown to kill spores of *Clostridium perfringens*, *Clostridium sporogenes*, *Clostridium tetani, Bacillus subtilis, and Bacillus athracis*[2].

CPC offers the distinct and critical advantage of immediate deployment. Inventories of CPC are immediately available and adequate supplies of CPC can be rapidly produced. Installations of CPC dispersion systems can be easily and feasibly incorporated into the **Containment Chamber** as well as into mailroom if necessary.

CPC also offers another large advantage. It is safe for humans. CPC has been safely consumed in commonly available, over-the-counter oral hygiene products such as Scope®[3] mouth rinse and Cepacol®[4] lozenges for more than forty (40) years. Writing about CPC, a Food and Drug Administration ("FDA") committee recently reported, "The 55-year United States marketing history is significant with respect to its safety.[5]" CPC is non-mutagenic and non-carcinogenic. It can, in some individuals, cause temporary skin irritations and can irritate mucous membranes when inhaled. All of these side effects are temporary.

It has also been shown to have no deleterious effects on equipment in the food processing industry. Thus it should have no ill effects on mail processing equipment.

2.7 Automated Mail Handling

A strategic partner with experience in the manufacture, sales and support of automated mail handling equipment will be brought onto the team as soon as the candidates can be screened and an agreement can be developed.

---

[2] *The Germicidal Action of Cetyl Pyridinum Chloride on Bacterial Spores.* T.W. Green and J.M. Bireland, Ohio State University, Columbus, OH (1941). **J. Bact. 44**:34.

[3] Scope is a registered trademark of Procter & Gamble

[4] Cepacol is a registered trademark of J. B. Williams Co. Inc.

[5] *OTC Drug Products for the Reduction or Prevention of Dental Plaque & Gingivitis, 81N-033P/RPT 1*, an FDA Dental Plaque Subcommittee report, page 70

This partner is expected to provide the platform on which the Containment Chamber, BioSentinel™ and the Bioagent Decontamination systems are to be integrated.

3.0 Development Team

3.1 Primary Team Members

MesoSystems Technology, Inc.

MesoSystems is a biotechnology systems company that designs, develops, manufactures and sells airborne microbial control systems. MesoSystems is a recognized leader in bioaerosol sampling. These products make the indoor air that we breathe safer by detecting and destroying harmful and even life-threatening bio-organisms. In 2000, the company introduced its first product, the BioCapture™ air sampler. The company expects to introduce several complementary products within the next year, including the Personal Air Sampler, which is designed to monitor the exposure of individuals to airborne microbes, and the Scavenger™, which is designed to remove airborne microbes and odors from indoor environments.

The BioCapture™ BT-500 and BT-550 products have captured nearly 100% bioaerosol sampling market share for civilian counter-terrorism (homeland defense).

MesoSystems core competencies are:

- Microbial sampling and detection
- Detection system integration
- Thermocatalytic air purification
- Advanced product development
- Rapid prototyping

MesoSystems has laboratories for:

- Bioaerosol sampling, including a fully-instrumented bioaerosol wind tunnel facility
- Development and testing of air purification and decontamination technology
- Microbiology laboratory for biosensor development and evaluation

Pacific Scientific Instruments, Inc.

As the world leader in particle counting with its Met One, Hiac Royco, and HYT product lines, Pacific Scientific Instruments is one of the principal players in ensuring minimization of damage due to particle contamination. Almost every time you take a medication, click a mouse, make a cell phone call, or turn on a TV, you touch the work of Pacific Scientific Instruments. PSI products and technologies are in use at virtually every global leader engaged in the manufacture of semiconductors, microelectronics,

pharmaceuticals and hydraulic systems. In the process, PSI draws upon a 40-plus year heritage of technical expertise and innovation. Over the last two years the Photonics R&D Department at PSI has developed and demonstrated state-of-the-art bio-particle detectors for air-borne bio-contamination applications.

Safe Foods Corporation

Safe Foods is an innovative new company developing and marketing revolutionary technologies that enhance the safety of the world's food supply. Safe Foods Corporation specializes in the development and commercialization of food safety technologies for producers, processors and consumers. The company's primary antimicrobial food safety technology is Cecure®, a patented product that kills foodborne pathogens such as Salmonella, E. coli, and Listeria on meat, poultry, eggs, fish, fruits and vegetables, as well as on food preparation surfaces.

In 1994, researchers at the University of Arkansas for Medical Sciences (UAMS) were granted the first of multiple patents on their discovery that a compound commonly used in mouth rinses and throat lozenges was also highly effective against foodborne pathogens. In June 1999, Safe Foods acquired the exclusive worldwide rights to the patents from UAMS and has since added multiple patent applications for food safety and related technologies. Safe Foods is anticipating the first FDA approval of Cecure in the first quarter of 2002.

The company also recently introduced FreshLight™, an advanced ultraviolet light disinfection technology used for killing pathogens in liquids used in food processing. FreshLight™ is already being acquired and used by the food processing industry.

3.2 Companies with Commercial Biodetection Products

We propose to integrate commercial off-the-shelf (COTS) biodetection capabilities for *B. anthracis*. The reasoning is simply that we need to be able to "stand up" a working system (albeit only partially automated) in a matter of a few weeks. The opportunity to add non-COTS biodetection capability and evaluate developmental biodetection components is an integral part of the second phase of the project. The following companies have COTS biodetectors that we believe are appropriate for integration with the Phase 1 BioSentinel™ system.

Company	Product
Idaho Technologies	*PCR-based biodetection*
Cepheid	*PCR-based biodetection*
Tetracore	*PCR and immunosensor reagents*

3.3 Project Management Approach

MesoSystems will serve as the prime contractor and lead organization for the project. Dr. Eric Hanczyc will lead the project.

In Phase 1, Pacific Scientific Instruments (PSI) and Safe Foods will be the major sub-contractors. Several minor subcontractors will be utilized for industrial design and fabrication support.

In Phase 2, two additional major subcontractors will be added to the team. These contractors will be identified during Phase 1 and involved in reviewing and assessing the Phase 1 SafeMail system.

Collaborator	Role on Team
TBD (e.g., USPS or Pitney Bowes)	*Mail room operations*
TBD (e.g., Lockheed Martin or Bell & Howell)	*Mail room automation equipment producer*

3.4 Key Personnel

Eric Hanczyc - Project Manager

Eric has been a senior member of the research team at MesoSystems since 1999. He is currently the Principal Investigator on MesoSystems contribution to DARPA's Immune Building Program (PM: Amy Alving). Prior to joining the MST team, Eric worked for four years as an R&D Process Control Engineer at the Weyerhaeuser Technical Center in Federal Way, Washington.

Eric received his Ph.D. in 1994 from the Department of Chemical Engineering and Material Science at the University of California, Davis. His doctoral thesis was titled "Control of Distributed Parameter Systems Described by Partial Differential Equations." In 1988, he received his M.S. in Chemical Engineering from the California Institute of Technology in Pasadena. Eric received his B.S. in Chemical Engineering from Lehigh University in Bethlehem, PA, in 1986.

Richard DeFreez - UV Fluorescence Detection Lead (PSI)

Richard DeFreez has conducted numerous laser-related studies as either a researcher or a principal investigator. After carrying out multiple consulting and contract research activities for the company, Dr. DeFreez joined Met One, Inc., now Pacific Scientific Instruments Company. As its Principal Scientist, he is working on the development of advanced particle detection strategies. In early 1998 Dr. DeFreez was appointed to the additional position of Photonics R&D Manager for Pacific Scientific Instruments which includes the Met One, High Yield Technologies, and Hiac Royco product lines. Dr. DeFreez is the primary architect for the newest fluorescence-based biological aerosol agent detectors, BARTS (Biological Agent Real Time Sensor) and Bioni.

Richard DeFreez received his Ph.D. in Applied Physics from the Oregon Graduate Institute of Science and Technology in 1985. He received his B.S. (Highest Honors, Distinction) in Physics from Sonoma State in 1980. He has published numerous papers and been an inventor on 21 pending and issued patents.

Curtis Coleman – Decontamination Lead (Safe Foods)

Mr. Curtis Coleman, age 53, is one of the founders of Safe Foods Corporation and, since its formation, has been leading the company in its efforts to gain the necessary regulatory approvals, establish industry relationships, and recruit a quality management team. He is co-founder, and former co-owner and CEO of Northwest Advantage Information Services, Inc., a software engineering and computer systems company in Northwest Arkansas, a managing partner and director for ArPharm Biotechnology, LLC, and a director and partner in Double RC Holding, Inc., both of Little Rock, AR.

He has more than 20 years experience as an executive director and president of non-profit corporations in Arkansas and Texas, including multi-million dollar international organizations. His business travels include 44 states and 27 countries. He is a graduate of Southern Arkansas University (B.S.) and studied at Southwestern Baptist Theological Seminary (M. Div.).

George Bajszar – Biodetection Lead

George has been the Director of Biotechnology Research and Development for MesoSystems since early 2000. His areas of expertise include: Biosensor technologies; recombinant DNA/gene technology; gene mapping, cDNA cloning, library construction, sequencing, PCR, yeast-, mammalian- and bacterial vector-host systems; heterologous protein expression in yeast, bacteria and mammalian cells; recombinant vaccines; protein analytical, and purification methods; immunochemical detection, mammalian cell culture and virology techniques; methods of microgenetics for strain selection and improvement.

He received his Ph.D. in Molecular Biology in 1978 from the Institute of Molecular Biology of the Academy of Sciences of Russia (Moscow). Also in 1978, he received a Ph.D. in Biology from the Scientific Qualifying Commission of the Hungarian Academy of Sciences in Budapest. In 1969, George received his M.S. (*summa cum laude*) in Biochemistry from the Kharkov State University in the Ukraine.

Vanessa Kenning – Sampler Lead

Dr. Kenning has been on the MesoSystems aerosol research team since 1998 and is currently the Sampler Systems Manager. She is responsible for the design and development air sampling technology and of a wind tunnel facility suitable for testing prototype devices. In addition to overseeing MesoSystems' wind tunnel facility, Dr. Kenning is also responsible for MesoSystems' computational fluid dynamics (CFD) simulations. These CFD simulations enable a variety of designs to be investigated without requiring fabrication of each design.

Vanessa received a Bachelor of Science degree in physics (Western Washington University) and a Ph.D. in mechanical engineering (Washington State University).

Andy Kamholz - Fluidics Lead

Andy recently joined MesoSystems and leads its projects on automated microfluidic sample preparation. He received his Ph.D. in Bioengineering from the University of Washington in Seattle in 2001. His doctoral dissertation was in the field of "Quantitative Analysis of Diffusion and Chemical Reaction in Pressure-Driven Microfluidic Channels." He maintains a strong working relationship with the Washington Technology Center's microfabrication facility and works closely with MesoSystems' strategic partners in microfluidic technology co-development.

Andy received his B.S. in Biomedical Engineering from Johns Hopkins University in Baltimore in 1996. He is a co-inventor on a patent titled "Microfabricated Diffusion-Based Chemical Sensor."

Patrick Call - Test and Evaluation Lead

Pat has led the product development group and in particular, the development of the BioCapture™ product from concept to production. He has participated in the device at Dugway Proving Grounds, including at the Joint Field Trials.

He received his B.S. and M.S. degrees in Mechanical Engineering at Montana State University, and has been a MesoSystems employee since in incorporation in 1997.

4.0 Intellectual Property and Commercialization

4.1 Existing Intellectual Property

Each party brings patented and unpatented intellectual property. The US Government has restricted rights to the use of some of the technology. Table 4.1 identifies areas in which IP currently exists.

Organization	Intellectual Property	Patents ?	Pending ?	US Gov. Rights?
MesoSystems				
	MicroVIC®™ Aerosol Concentrator	Yes	Yes	Yes
	BioCapture™ Aerosol Collector	Yes	Yes	Yes
	Aerosol Archiver™	No	Yes	No
	Mail Screening System Architecture	No	Yes	No
PSI	BARTS Particle Counter	No	No	Yes
	Bioni™ Particle Counter	No	Yes	No
	Bioni™ Software	No	Yes	No
Safe Foods	Cecure™ decontamination	Yes	Yes	No

4.2 Treatment of New Intellectual Property

Standard intellectual property rights shall govern. Inventions made solely by employees of one firm shall remain with that employer. Inventions made jointly by employees of more than one firm shall become jointly owned by the respective firms.

4.3 Commercialization

MesoSystems and its partners expect that a large corporation, established in the mail processing and/or biodefense markets, such as Lockheed Martin, will be the ultimate system integration and producer of the SafeMail product. MesoSystems, PSI and Safe Foods will ultimately be component suppliers of their core technologies to the integrator. Discussions with more than one such system integrator are already in progress.

5.0 Statement of Work

Phase 1: Initial Demonstration and Temporary Operational Solution

MesoSystems and its subcontractors (collectively, the "Contractor") shall construct the core pieces of the BioSentinel™ product, including the UV laser fluorescence detector and the high flow rate wet sampler. These components will be integrated such that a triggering signal (alarm) from the fluorescence detector will automatically activate the wet sample collection.

Commercially available biodetection equipment will be procured and evaluated. (No integration, nor automation, of the detection components will be attempted in Phase 1.)

A suitable test site will be identified and an agreement will be executed allowing access to the mail processing facility by the Contractor.

A containment chamber will be designed and fabricated which includes a blower and HEPA filtration system capable of maintaining a negative pressure balance in the containment chamber.

The components will be deployed to the test site by the Contractor.

The Contractor shall test and evaluate the system using letters that have been spiked with *Bacillus globigii* spores (BG).

The Contractor shall develop and install a demonstration of the Cecure™ decontamination system.

The Contractor shall develop a detailed Phase 2 work plan, which includes performance specifications for the Phase 2 system.

All Contractor personnel shall at all times comply with existing laws regarding health and safety and the disposal of hazardous wastes.

Phase 2: SafeMail: A Permanent Solution

Mail processing centers need a permanent solution to screening mail for biological agents. The system should be compatible with existing facilities and processes, at least to the extent possible. To this end, Phase 2 of the project is directed at developing a robust, reliable fully automated system. The system deployed at the end of Phase 2 represents a beta prototype of what is to become the SafeMail product.

The Contractor shall develop and demonstrate a fully automated SafeMail system, based on performance measurements and operational experience gained from the partially automated system developed and tested in Phase 1.

6.0 Cost and Schedule Estimates

6.1 Project Schedule and Cost Estimate and Schedule

The SafeMail development project is assumed to be a one-year project. A follow-on project may be required to develop and deploy enhancements to the system.

Phase 1 is estimated to cost $600,000. An estimated cost breakdown is shown in the table below. Phase 1 is expected last 4 months.

Task	Task Lead	Task Budget
Project Management	MesoSystems	$50k
UV Fluorescence Detector	PSI	$100k
Wet Sample Collector and Fluidics	MesoSystems	$50k
Aerosol Archiver	MesoSystems	$40k
Cecure™ Decontamination	Safe Foods	$100k
Containment Chamber	MesoSystems	$40k
System Integration, Electronics, Software, User Interface and Control System	MesoSystems	$50k
Detection system procurement	MesoSystems	$100k
Testing and Evaluation	MesoSystems	$70k
	Phase 1 Total:	**$600k**

The containment chamber may be produced by Amaircare, a manufacturer of portable clean rooms and containment chambers and HEPA filtration systems (www.amaircare.com). A dialog has not yet be initiated, but they appear to have desirable expertise in containment and filtration.

The detection system procurement includes a $60,000 cost estimate for Idaho Technology's RAPID PCR system and an Alexeter Guardian™ Immunoassay Reader, and associated reagents. Other systems will be considered for substitution and augmentation, including SRI's Upconverting Phosphor Immunoassay technology, and Becton Dickenson's flow cytometry products. MesoSystems has a Cepheid Smart Cycler that will be available without charge if we can be supplied with reagents, perhaps from the US Government. Equipment leases will also be considered to reduce cost.

Phase 2 is expected to cost $2-3M. A detailed work plan and cost estimate will be generated during the first four weeks of Phase 1. Phase 2 is expected to last 9 months. It will begin one month prior to the conclusion of Phase 1. It is expected that Phase 2 may be led by or co-led by a major systems integrator such as Lockheed Martin.

6.2 Commercial Equipment Cost Estimate

The table below provides a very preliminary cost estimate for the BioSentinel™ Microbial Detection System. The costs assume the items are purchased at "commercial-off the shelf" (COTS) items.

Number of Units Produced	BioSentinel™ Cost	Cecure™ System Cost	Installation cost	Annual Operating Cost
10	300,000	$60,000	100,000	100,00
100	200,000	$40,000	75,000	75,000
1000	150,000	$35,000	50,000	50,000

If the SafeMail system is widely deployed, the total cost, including installation and first year operating cost, are estimated to be $300,000 per installation.

These cost estimates do not include the cost of the automated mail handling facility. It has been assumed that the SafeMail system can be added to existing equipment. Such an assumption is necessary at this early stage, but further refinement will be possible as discussions with mail processors and equipment suppliers become involved in the project.